

Japanese Laid-Open Utility Model Application Publication (kokai)

No. 02-58796 issued April 26, 1990

Utility Model Application No.: 63-138722

Application Date: October 24, 1988

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[Title of the Invention] Keyboard Lid

## Specification

### 1. Title of the Invention:

KEYBOARD LID

### 2. Claims for Registration of Utility Model:

(1) A keyboard lid comprising a lid covering an upper surface part of a keyboard being bisected to a front end side and a rear end side, wherein those bisected are mutually connected by a hinge and the half lid on the front end side is supported by a lever attached to both sides of that half lid so as to carry out turn motion and a rear end of the half lid on the rear end side is supported slidably by a slide guide mechanism.

(2) A keyboard lid comprising a lid covering an upper surface part of a keyboard, wherein a front end side of the lid carries out link motion according to a turning track of a lever connected to both sides of the lid by link connection and a rear end of the lid is supported slidably by a slide guide mechanism.

### 3. Detailed Description of the Invention:

#### "Industrial Application Field"

The present invention relates to a keyboard lid applicable to keyboard musical instruments such as piano, organ and synthesizer.

## "Conventional Art"

One lid of a keyboard musical instrument is structured to include, as illustrated in Figure 5, a rear end of a lid 1 being pivotally held for a musical instrument body 2 by a hinge and a front end side opening and closing to depict a circular arc with a radius of the lid 1 with the depth measurement L to open and close an upper part of the keyboard 3; and

the other lid of a keyboard musical instrument is structured to include a rear end side of the lid 1 being supported slidably for a musical instrument body 2 as illustrated in Figure 6 and in the state with a front end side being lifted, the lid 1 is caused to slide back and forth to, thereby, open and close the upper part of the keyboard 3.

## "Problems to be Solved by the Invention"

In the case of playing a musical instrument, a rhythm generator or an electronic musical instrument as a recent trend frequently takes a mode of activating various kinds of a timbre controller, a timbre storage device and the like to carry out musical performance.

Those electronic appliances are generally put on an upper surface UP of a musical instrument body 2 so that a musical performer operates those electronic appliances easily.

However, structure of the lid illustrated in Figure 5 is disadvantageous in the point that a front surface of the electronic appliances put on the upper surface UP of the musical instrument body 2 is hidden by the lid 1.

In this regard, in the structure of the lid illustrated in Figure 6, the lid 1 does not pop up to the upper surface UP of

the musical instrument body 2. Therefore, when an electronic musical appliance is put on the upper surface UP of the musical instrument body 2, the electronic appliance is not hidden by the lid 1. In this regard, the lid 1 illustrated in Figure 6 is excellent.

However, since the front end side of the lid 1 is free at the occasion of opening and closing the lid 1, the opening and closing operations on the lid 1 are not restrained. Therefore, stability is disadvantageously bad. That is, for example, the lid 1 is pushed backward with less lifting amount of the lid 1, the downward protruding portion 1A formed in the front part of the lid 1 is applied to a black key of the keyboard 3; otherwise too much upward lift of the lid 1 causes the lid 1 to act as a lever to apply unreasonable load to the lid 1 due to the act of the lever to occasionally damage the lid 1 and a slide mechanism slidably supporting the lid 1, which, therefore, is disadvantageously lacking in reliability and durability.

An object of the invention hereof is to provide a keyboard lid, wherein an opened lid does not pop up higher than an upper surface of a musical instrument body; and moreover opening and closing operations are restrained so that a front end side of the lid depicts a stipulated turn track; and unreasonable force is not applied to the lid, the musical instrument body and the supporting mechanism of the lid.

#### "Means for Solving the Problems"

A first invention of the application hereof is structured to include a lid covering an upper surface part of a keyboard being bisected to a front end side and a rear end side, wherein those

bisected are mutually connected by a hinge and the half lid on the front end side is supported by a lever attached to both sides of that half lid so as to carry out turn motion and a rear end of the half lid on the rear end side is supported slidably by a slide guide mechanism.

According to the structure of the first invention hereof, the lid is bisected into the front end side and the rear end side to perform opening and closing motions in a double-bent state.

That is, the bisected half lid on the front end carries out turn motion with a lever. The half lid on the rear end side carries out slide motion by link-connection and is housed inside the musical instrument body.

Thus, by bisecting the lid, the depth measurement of the half lid carrying out turn motion can be made small. Accordingly, since the turn radius of the turn motion can be made small, the pop up amount of the lid carrying out turn motion gets small. Therefore, it is possible to prevent the lid from significantly protruding to the upper surface of an musical instrument and the like.

A second invention of the application hereof is structured so that the lid is not bisected but the front end side of the lid undergoes link connection to a lever to carry out link motion and the rear end of the lid is slidably supported by a slide guide mechanism.

According to the structure of the second invention hereof, the lid is an integral type; the front end side of the lid carries out link motion; that link motion causes the rear end

side to slide; and the lid moves back and forth to open and close the upper part of the keyboard.

Therefore, according to the second invention hereof, since the lid moves approximately in parallel, the lid and the upper surfaces of the body can make a substantially common surface, giving rise to an effect that thickness of the musical instrument and the like can be made small.

#### "Embodiment"

An embodiment corresponding to the first invention of the application hereof is illustrated in Figure 1 and Figure 2. Likewise description on the prior art described with Figure 5 and Figure 6, there are included a lid 1, a body 2 of a musical instrument and the like and a keyboard 3.

In the first invention hereof, the lid 1 covering the upper surface part of the keyboard 3 is bisected into a front end side and a rear end side. The bisected half lids 1A and 1B are mutually connected freely bendably with a hinge 4.

Both side ends of the half lid 1A on the front end side is attached to a turn loose end of a lever 5 turnably attached to the body 2 on both sides and is supported to carry out turn motion together with the lever 5.

On the other hand, the half lid 1B on the rear end side is supported slidably at its rear end with the slide guide mechanism 6. The slide guide mechanism 6 can be configured by a linear guide rail 6A attached to inner walls of both sides of the musical instrument body 2 and a slide roller 6B attached to both sides of the rear end of the half lid 1B and coming into engagement with that guide rail 6A to guide the rear end of the

half lid 1B along the rail 6A to cause the rear end of the lid 1 to carry out linear motion.

A metal plate having U-shape section, for example, can be used for the linear guide rail 6A which guides a slide roller 6B engaged with a U-shape concave part.

In addition, the example hereof illustrates an example of the linear guide rail 6A provided with inclination in the direction gradually descending as backward motion is carried out. By inclining the guide rail 6A thus, the lid 1 is opened. Then the weight of the lid 1 acts so that the lid 1 is pulled in and good touch is obtainable at the time of opening and closing operations.

Figure 2 illustrates a state where the lid 1 is opened. As illustrated in the drawing, the depth measurement  $L_1$  of the half lid 1A on the front end side and the depth measurement  $L_2$  of the half lid 1B on the rear end side can be respectively made small by bisecting the lid 1. Consequently, the half lid 1B can be housed inside the musical instrument body 2 with a small movement amount.

In addition, since the depth measurement  $L_2$  of the half lid 1B can be made small, a small movement amount is sufficient. Accordingly, a small turn radius  $R$  of the lever 5 is sufficient. Consequently since the turn radius of the half lid 1A on the end side becomes small, the lid 1A on the front end side can be produced so as not to protrude upward beyond the upper surface UP of the musical instrument body 2 in the state where the lid 1 is opened.

Figure 3 illustrates an embodiment corresponding the second invention of the application hereof. The embodiment hereof is structured to include the lid 1 with its front end side being directly pivotably supported turnably by the shaft 9 for the lever 5 and the rear end side being engaged with the slide guide mechanism 6.

That is, the lever 5 is shaped to get bent by 90°. A front decorated panel 8 is attached to its turn loose end. The front decorated panel 8 acts as a handle in the case of opening and closing the lid 1 as well.

For forming the front decorated panel 8, an aluminum extrusion molding machine, for example, can be utilized. The turn loose end of the lid 1 is inserted through a slit formed in a hollow part in the side direction. The lid 1 is pivotally and turnably supported by the shaft 9 for the front decorated panel 8. The front decorated panel 8 is turnably operated to cause the lid 1 to slide backward by link connection motion.

The roller 6B is attached to the rear end of the lid 1. That roller 6B comes into engagement with the slide guide rail 6A provided on the inner walls of both sides of the musical instrument body 2 and is guided.

Here, for the example hereof, structure is illustrated in the case where the slide guide rail 6A is inclined upward in the rear end side to avoid contact of the rear end of the lid 1 to a part 10 in order to avoid the tall part 10 (a transformer, for example) arranged backward for the purpose of making thickness of the musical instrument body 2 thin.



Here, the panel handle 8 has a concave part 8A on the front side in the state where the lid 1 is closed. When the lid 1 is opened, the concave part 8A is used as a handle. Moreover, in the state where the lid 1 is opened, the concave part 8A is positioned upward as illustrated in Figure 4. At that time, the music rest 11 is mounted on the upper surface UP of the musical instrument body 2. Thereby that concave part 8A is utilized as a groove holding the lower part of a musical score.

Thus, according to structure of the embodiment illustrated in Figure 3 and Figure 4, the lid 1 remains flat and just slides. Therefore, the musical instrument body in its entirety can be produced small in thickness.

#### "Advantages of the Invention"

As described above, according to the invention hereof, the front end side of the lid 1 moves by being restricted by the turn radius of the lever 5. Therefore, the lid 1 is not largely lifted upward nor pried out.

In addition, as in the case of the first invention, due to structure with the upper part of the keyboard 3 being opened in a double-bent state, the lid 1 will not protrude largely upward. Therefore, even if an electronic musical instrument is stacked on the upper surface UP of the musical instrument body 1, the front panel of the electronic musical instrument is not hidden by the lid 1 but the electronic musical instrument can be operated easily.

In particular, the embodiment illustrated in Figure 3 and Figure 4 is structure so that the lid 1 is not bent into two but keeps the integral flat plate state to slide and be sent to

inside the musical instrument body 2. Therefore, the thickness of the musical instrument body 2 can be made thin.

Here, the case where the invention hereof is applied to keyboard musical instruments has been described above. The lid can be utilized to protect the keyboard of a personal computer or a word processor, for example, as another example.

#### 4. Brief Description of the Drawings:

Figure 1 and Figure 2 are sectional diagrams for describing an embodiment of a first invention of the application hereof; Figure 3 and Figure 4 are sectional diagrams for describing an embodiment of a second invention of the application hereof; and Figure 5 and Figure 6 are perspective views for conventional description.

1 ... lid, 1A, 1B ... half lid, 2 ... musical instrument body, 3 ... keyboard, 4 ... hinge, 5 ... lever, 6 ... slide guide mechanism.

Figure 1

- 1 LID
- 1A HALF LID
- 1B HALF LID
- 3 KEYBOARD
- 4 HINGE
- 5 LEVER
- 6 SLIDE GUIDE MECHANISM

Figure 2

- 4 HINGE
- 5 LEVER

Figure 3

- 1 LID
- 5 LEVER
- 8 FRONT DECORATED PANEL
- 9 SHAFT

Figure 4

- 3 KEYBOARD
- 5 LEVER
- 6 SLIDE GUIDE MECHANISM
- 9 SHAFT